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NEW NAVAL AND MILITARY INDUSTRIES.

The Congress which has just concluded its labors has been a notable one. The American navy has gradually gone on the downward path until the country is well nigh without defenses. The forts, while still maintained, are out of date, and the ordnance is far behind the age. The attention of the Senators and Representatives has at last been effectually aroused, and large appropriations, amounting to many millions of dollars, have been made for new works. It is yet too soon to know the exact amount, but enough has been designated to have a very great effect upon the industries of the country.

The naval vessel of to-day is a structure of iron and steel. In the generalities and details of the process of its manufacture and of the ultimate construction, all branches of mechanical engineering are involved. The features of the construction are no longer settled, as was the case with the old sailing ships, by precedent. The former navy was the creation of sailors and shipbuilders. The modern ships of war are the creation of inventors and of engineers. The same applies to ordnance. The successful originators of machine guns, breech loading cannon, and torpedoes must be unfettered by precedent. Originality must be the keynote of success.

This much refers to the product; but in the plant required for its production a great field for industrial enterprise is offered. For these appropriations to be expended, new plant of a type not existing in this country will have to be installed. New rolling mills for heavy plate, steel works for casting cannon ingots, all have to be organized. It seems probable that the 49th Congress, by its appropriations for these objects, will have exercised a most marked influence on the iron manufacture and mechanical interests of the country.

America has preserved to the present day one item of her prestige undiminished. She is still the land of inventors. In the expenditure of these amounts a great field for her inventive talent seems opened. The people of this country do not want to follow blindly in the tracks of other nations. We should originate improvements in ships and guns ourselves. In machine guns we have already led the world. Our record in heavy pieces should be, and we hope will be, as great. Complaints of the failures of foreign artillery are frequent. The recent bursting of an Armstrong cannon on the Collingwood, and more recent criticisms of Krupp's guns, show that perfection is not yet reached. Even in the material there may be a change. We are now the leading manufacturers of aluminum; we may yet be the first to apply it successfully to the manufacture of ordnance.

We have already taken the ground that America, from her isolated position, does not need the standing army and the reserve supplies that alarmists consider requisite. Yet in the expenditure of these new appropriations we can see a promise of much good. They will stimulate invention and industry, because the amounts are a premium for whatever is new and valuable.

In fortification, which now has to be on new lines, owing to the increased power of artillery, there is also a vast field for original work.

WAR AND INVENTION.

(*Concluded from page 32.*)

It will readily be perceived that war in European countries, where a very large percentage of the effective manhood of each nation is sent to the field or into garrison, calls for as many labor-saving inventions in the arts and manufactures as it does in purely warlike directions. Given a machine that will do the work of ten men—even though at no saving of expense on the cost of the manual labor whose place it takes—it will find in war time innumerable uses which might not be accorded to it in peace. Similarly, a machine that can be managed or tended by a woman will take precedence in war time of one doing the same work but requiring the care of a man. These facts should be remembered by inventors when deciding in what countries they will take out patents. They should also bear in mind that in Europe, while inventions which are wanted by the government—particularly those directly devoted to war purposes—may be appropriated to government use without the patentee's consent, it is customary for the government to reward the inventor according to the importance of the invention and the use made of it. In Great Britain it is now the practice for a board of officers to pass upon the value of the invention, and to recommend the amount of royal grant which shall be made to the patentee. They are not usually illiberal in their allowances.

Of course, one of the important requisites of a land campaign is an efficient transportation service for food, ammunition, clothing, arms, hospital stores, general supplies, and for the sick and wounded. Anything which simplifies or lessens the cost of transportation becomes almost a necessity to a great army. Thus, in addition to the improvements in the ordinary running gear of wagons and ambulances, the inventor has wide scope in steam motors capable of going anywhere over roads accessible to ordinary heavy vehicles. Even the shoes and harness of draught animals may afford opportunity for successful invention. Pontoon and other styles of bridges, suitable for rapid transportation in sections, or designed for construction from growing timber, would be generally used in a European war.

While it would probably be difficult to mention all the varieties of invention that would, or should, receive a special impetus from a great war, the following alphabetical list includes the greater number:

Accouterments, aerial machines, air-guns, alloys for gun metal, ambulances, ammunition, amputating instruments, anæsthetics, antiseptics, artificial limbs, armor for ships and forts, arms of all kinds, artillery and carriages, balloons, balsas, bandages for wounds, battery guns, battery forges and tools, bayonets, beacons, bombs and bomb proofs, boilers, breech-loading arms, bridges, bullets, bullet machines, buoys, cables, caissons, cannon, cannon balls and projectiles, carriages, carts, cartridges, clothing for soldiers, compasses, derricks, diving apparatus, drydock machinery, dynamos, electric appliances, explosive compounds, ferry boats, field guns, field telegraphs, fire arms, floating batteries, flying machines, fog signals, fuses, gun carriages, gun equipments, great guns, harness, hydraulic machinery, horse shoes, intrenching tools, life boats, lubricators, machine guns, magazine fire-arms, medical appliances, mining appliances, nautical appliances, oil-burning furnaces, ordnance, propellers, pontoons, powder-making machinery, primers, projectiles, railway rolling stock and appliances, rams, road-making machinery, reaping and other agricultural machinery, rockets, saddles, shells, splints, steam machinery, submarine appliances, surgical appliances, tents and fittings, tools, torpedoes, torpedo craft, tourniquets, well diggers, woodworking machinery, wrecking machinery.

The foregoing list, extended as it is, embraces only the general heads of products and machinery which would receive a special impetus by a European war. The inventor will readily add thereto the thousand and one developments and subdivisions of the list. Enough is given to show that the inventive genius of our people can be actively and profitably employed in case the great powers unhappily should prefer war to peace.

CELEBRATION OF THE CENTENNIAL OF THE ENACTMENT OF THE PATENT LAWS.

To the Editor of the Scientific American:

The first patent law was enacted in U. S. A. on the 10th of April, 1790. I would suggest that inventors meet in 1890 at some place for centennial celebration, for the purpose of showing the great progress made by the American genius under the protection of the law. I would like to hear from others. F. M. SHIELDS.

Coopwood, Miss.

[As the locality for such a convention, we would suggest this city. The patent law was passed by the first United States Congress, whose first two sessions met in New York, the first session lasting from March 4 to September 29, 1789, and the second from January 4 to August 12, 1790. An exhibition of inventions, of early productions of the pioneers of the arts, might be organized in connection therewith, and a really memorable centennial might be celebrated. We echo the sentiment of the last sentence of our correspondent's letter. Others should be heard from.]

The Largest Farm in the World.

In the extreme southwest corner of Louisiana lies the largest producing farm in the world. It runs 100 miles north and south, and many miles east and west, and is owned and operated by a syndicate of Northern capitalists. Their general manager, J. B. Watkins, gives an interesting account of this gigantic plantation, which throws the great Dalrymple farm in Dakota into the shade completely.

"The 1,500,000 acres of our tract," Mr. Watkins said, "was purchased in 1883 from the State of Louisiana and from the United States Government. At that time it was a vast grazing land for the cattle of the few dealers in the neighborhood. When I took possession I found over 30,000 head of half-wild horses and cattle. My work was to divide the immense tract into convenient pastures, establishing stations or ranches every six miles. The fencing alone cost in the neighborhood of $50,000. The land I found to be best adapted to rice, sugar, corn, and cotton. All our cultivating, ditching, etc., is done by steam power. We take a tract, say half a mile wide, for instance, and place an engine on each side. The engines are portable, and operate a cable attached to four plows, and under this arrangement we are able to plow thirty acres a day with only the labor of three men. Our harrowing, planting, and other cultivation is done in a like manner; in fact, there is not a single draught horse on the entire place. We have, of course, horses for the herders of cattle, of which we now have 16,000 head. The Southern Pacific Railroad runs for thirty-six miles through our farm. We have three steamboats operating on the waters of our own estate, upon which there are 300 miles of navigable waters. We have an ice house, a bank, a ship yard, and a rice mill."—*St. Louis Republican.*

Preserving Hides with Kieselguhr.

In the treatment of hides and skins with a view to preserve them from injury through rotting, maggots, and other products of decomposition, Mr. E. A. Brydges, of Berlin, proposes to treat them with kieselguhr or berghmehl, which corresponds to the fossil meal, diatomite, or infusorial earth of the English, and consists of the shells of minute animals of such extreme fineness that a cubic inch of fossil meal contains upward of forty thousand million shells. This fossil meal consists, chemically considered, of over 90 per cent of silicic acid and a small percentage of potash and organic matter, which latter can be removed by simple calcination, and is extraordinarily hygroscopic, being, in fact, capable of absorbing an enormous quantity of fluid. The invention of Mr. Brydges consists in a novel treatment or process of treating raw and other hides or skins prior to tanning, tawing, or other treatment, in order to free them from all fluid matter which could promote or assist putrefaction, and to deprive them of all nourishment for insects, which cause such enormous damage to hides and skins during transport. It may be mentioned that according to Berzelius this fluid matter composes two-thirds, while the fibers weigh only one-third of the entire hide.

The advantage of the kieselguhr is that, although it possesses the property of absorbing fluids and other matter in solution with great energy, it is not itself absorbed or in the least degree affected. Mr. Brydges employs the kieselguhr in various manners; for instance, he takes it as it leaves the mine, and simply dries it, or he calcines it, either exposed to the atmosphere or in closed retorts or other apparatus, so that the meal is carbonized. Both systems of calcining—that is to say, (*a*) exposed to atmospheric influence by calcining in the open air or in an ordinary calcining furnace; (*b*) by calcining in closed retorts or vessels—can be readily carried out, and will give excellent material for preserving hides. All organic matter having been removed, the absorbing power of the mineral is increased, but Mr. Brydges does not restrict himself to employing it calcined, as washed and dried or raw dried kieselguhr or fossil meal of any kind in a dry state can be employed; neither does he restrict himself to any special manner of treating the hides, as they can be manipulated in various ways without departing from the nature of the invention.

The hides for transport, or hides which are to be dried rapidly, are spread out on a layer of the mineral with the epidermis or the fleshy side downward, and are then covered with a second layer of the mineral. The hides, if not required for immediate transport, are allowed to lie for a time, and can, if desired, be subjected to pressure, although Mr. Brydges believes that this will seldom be found necessary or even advisable. It is, furthermore, advisable in the case of perfectly raw hides—that is, hides fresh from the carcasses—to replenish or change the layer or layers of the mineral, so as to facilitate the drying process. Hides for transport can also be rolled up or packed in kieselguhr, so as to protect them from all injury during the sea or other voyage, the weight of the mineral being so small that the freight difference will be of little or no importance. Spent kieselguhr can be rendered fit for re-employment by simply calcining it, so as to destroy any and all organic matter contained in or absorbed by it.

Great Pumps.

At a recent meeting of the Engineers' Club, Philadelphia, Mr. Henry R. Cornelieus read a paper relating to the two large centrifugal pumps at Mare Island Navy Yard, California, built by the Southwark Foundry and Machine Company.

The pumps, the dimensions of which are 42 inch discharge pipes and 66 inch runners, are each driven direct by a vertical engine 28 inches diameter by 24 inches stroke, and were designed to remove the water from a dock 529 feet long, 122 feet wide, and 36 feet feet deep, with a capacity of 9,000,000 gallons.

After being erected on foundations prepared by the government, a test trial was made by a naval board, the following being extracts from their report:

At the final trial of the two pumps together, the water was admitted to the 23d altar, the dock containing 7,317,779 gallons, being 7 feet above the center of the pumps.

"Everything moved most admirably, and the performance of these immense machines was almost startling. By watching the water in the dock, it could be seen to lower bodily, and so rapidly that it could be detected by the eye without reference to any fixed point."

"The well which communicates with the suction tunnel was open, and the water would rise and fall, full of rapid swirls and eddies, though far above the entrance of these tunnels."

"Through the manhole in the discharge culvert the issuance from the pipes could be seen, and its volume was beyond conception." "It flowed rapidly through the culvert, and its outfall was a solid prism of water, the full size of the tunnel, projecting far into the river."

"During a pumping period of 55 minutes, the dock had been emptied from the 23d to 2 inches above the 6th altar, containing 6,210,698 gallons, an average throughout of 112,922 gallons per minute. At one time, when the revolutions were increased to 160 per minute, the discharge was 137,799 gallons per minute. This is almost a river, and is hardly conceivable."

"The engines worked noiselessly and without shock or labor. At no time during the trial was the throttle valve open more than ⅜ inch."

"The indicator cards taken at various intervals gave 796 horse power, and the revolutions did not exceed 160 at any time, though it was estimated that 900 horse power and 210 revolutions would be necessary to attain the requisite delivery, so that there is a large reserve of power available at any time."

"The erection of this massive machinery has been admirably done. All the parts are strong, and of excellent design and workmanship; simple, and without ornamentation."

"Looking down upon them from a level of the pump house gallery, they are impressive and massive in their simplicity."

"The government is well worthy of congratulation in possessing the largest pumping machinery of this type and of the greatest capacity in the world, and the contractors have reason to be proud of their work."

Photographs on Glass, Pottery, etc.

An improved process of producing photographs on pottery ware, glass, etc., known as a photo-ceramic process, has been patented by the Hon. Denis Lawless, of the Barracks, Aldershot, and a few notes concerning it may be of interest to your readers. The patentee says (I quote from his specification, which is No. 358, 1886):

"My invention relates to a photo-ceramic process for producing pictures, photographs, or other designs on tiles, plaques, or other objects of pottery ware, or on plates or other objects of glass, metal, or other similar substances, by impressing on them a raised and depressed surface corresponding to the lights and shades of the picture, photograph, or other design, by means of a die or mould into which, or with which, the clay, glass, metal, or other material used for making the object is pressed or moulded. The die or mould is made by casting in metal, or by electrotyping from a reverse mould, or it may be made in plaster, wax, gutta percha, or other material, the mould being taken from a 'gelatine relief,' or from a reverse mould thereof, or the 'gelatine relief' itself may be used direct for impressing the object with the raised and depressed surfaces. After the object has been moulded or impressed, it is glazed or enameled with a colored glaze, enamel, or other vitreous substance which is more or less transparent, and is then fired or heated to a temperature sufficient to melt the enamel, which then runs into the depressed parts of the object, which correspond to the darker or shaded parts of the picture or design, leaving the raised parts corresponding to the lighter parts, thus producing the original picture or design, with all its graduations of shade, in whatever color the glaze or enamel may be, if the body of the object is white, or modified, if it is colored, according to the color of the glaze or enamel. By the use of various colored enamels the picture or design on the object may be produced in colors. The 'gelatine relief' may be made according to Poitevin's process by allowing the light to act through a negative or positive transparency of the picture, photograph, or other design, or in some cases the picture or photographic print may itself be used as a transparency, on to a surface of bichromated gelatine of such a thickness as will be necessary for the amount of relief required. The bichromated gelatine is made by adding bichromate of potassium or ammonium to a warm solution of gelatine and afterward allowing it to set and dry on a level surface such as a glass plate, or the gelatine mass may be bichromated after it is set by soaking it in a solution of bichromate of potassium or ammonium. After the dried surface or film of bichromated gelatine has been sufficiently exposed to the light under the transparency of the picture or design, it is placed to soak in water, which causes those parts which have been protected from the light to swell up by absorbing the water, while those exposed to the light remain unswollen in a greater or less degree, according to the transparency or opaqueness of the various parts of the negative or positive transparency. The mould is then taken from the 'gelatine relief,' while the mass remains in a swollen condition. The 'gelatine relief' may also be produced according to the 'Stannotype' process by washing away in hot water those parts which have not been rendered insoluble by the action of light. In this case some pigment such as Indian ink should be added to the bichromated gelatine forming the surface or film. In making the bichromated gelatine mass, I find a suitable proportion of quantities to be ten grains of potassium or ammonium to one ounce of gelatine; or, instead of using only gelatine, I sometimes use a mixture of sugar and gelatine in the proportion of one part of sugar and eight parts of gelatine. In the application of the process to metals or other substances that can only be mouided in a molten condition or stamped or impressed under great pressure, I prefer to take an electrotype of the cast or mould from the 'first' or gelatine mould, and then proceed as hereinbefore set forth."

The patentee says that "he is aware that it is not new to produce 'first moulds' by the bichromatized gelatine process; neither is it new to glaze articles by dipping them in, or coating them with, glaze or enamel, and then firing them. But by the combination of these known processes, carried out in the manner described, he produces artistic results never before attained by a purely physical process.—*J. T. N., in Eng. Mech.*

Interference Plates for Photo Process Purposes.

In reply to inquiries where these plates may be obtained, one of our experts to whom we referred the matter gives the following information:

There are no perfect tints in the market that will do for the Meisenbach or interference process. Each individual who has worked the process in this country has had to either rule the plates for himself or else engage either a steel plate engraver or a metal ruler to rule the plates for him. The difficulty lies in the wearing of the cutting or the scraping tool. In engraving a ruled tint of, say, one hundred or one hundred and twenty lines to the inch, say ten inches square, one thousand lines or one thousand two hundred lines would have to be cut, or the equivalent of a line ten thousand inches long. Before the tool has traveled this distance, the sides of it are worn away so that the line cut is perceptibly narrower than on the start, and you have to suppose that no accident or clogging of the tool has occurred in this long journey. The same holds good in cutting through the most delicate friable ground on glass in order to obtain a direct negative. Another and just as important reason for not obtaining the desired result is the fact that the whole tint must be cut at one sitting without stop or rest, until the work is done. Any stop will show on the tint, especially a close one. The writer has spent some thousands of hours and of dollars in the attempt to get the desired result, and has never yet seen a perfect tint ten inches square of even one hundred lines to the inch, much less one hundred and twenty or one hundred and thirty lines. To accomplish the result, you must have, first, a perfect screw in your ruling machine, and a tool that will never wear out. When you get this, find, if you can, a metal that won't clog and a man that won't tire, and you can perhaps get your perfect results. On glass, you must have a composition that will neither clog the tool nor strip from the glass, and if you want to make a negative from a tint, and get one hundred and twenty lines to the inch from a printed tint, you will have to find some new means of printing the tints, to get them perfect enough to get the desired negative. This is not said to discourage the process people, who want perfect tints, but simply to explain why they are not in the market. You can of course get an approximate result, which is really all any of them get.

Treatment of Bright's Disease.

Semmola, of Naples, in an article in the *Wiener Medizinische Blatter*, No. 49, advises strongly against allowing a patient who is suffering from nephritis to come in contact with cold in any avoidable way. Such patients are excessively sensitive to cold, and cold baths are followed by great shock and depression. Violent massage and exercise of the muscles the author also strongly deprecates as followed by great shock and weakness.

He would advise the patient to live in a dry and equable climate; to strictly avoid all exposure or going about in severe winter weather; to practice mild gymnastics in a comfortable room rather than venture into a temperature below 18° or 20° C. The author emphasizes the remarkable sensibility of the skin of the sufferer with Bright's disease to all variations of temperature. Sodium iodide and chloride is advised in doses as large as tolerated. When, after two or three weeks, albumen has not entirely disappeared and dropsy has been relieved, phosphates of sodium or calcium are given in quantities as large as 40 grains or a drachm daily. The efficacy of these drugs the author believes consists in their power to promote the assimilation of albumen.

The methodical inhalation of oxygen, which Semmola has urged since 1867, has been repeatedly proved to be of the highest benefit. Albumen soon disappears after its use, and although casts may remain in the urine, the patient's general condition is so much improved that the author thinks we have here an argument for the dyscrasic or hæmatogenic origin of Bright's disease.

All astringents are considered not only valueless, but also injurious. Especially is the action of ferrum sesquichloratum and plumbum aceticum thought injurious, because of their astringent influence on the capillaries of the skin.